Notice No.3

Rules and Regulations for the Classification of Ships, July 2017

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: December 2017

Amendments to	Effective date	IACs/IMO implementation (if applicable)
Part 3, Chapter 1, Section 5	1 January 2018	N/A
Part 3, Chapter 1, Section 9	1 January 2018	1 January 2018
Part 3, Chapter 2, Section 1	1 January 2018	N/A
Part 3, Chapter 4, Section 6	1 January 2018	N/A
Part 3, Chapter 9, Section 6	1 January 2018	N/A
Part 3, Chapter 13, Section 9	1 January 2018	N/A
Part 3, Chapter 16, Section 11	1 January 2018	1 January 2019
Part 4, Chapter 2, Section 1	1 January 2018	N/A
Part 4, Chapter 4, Section 5	1 January 2018	N/A

Part 3, Chapter 1
General

■ *Section 5*
Information required

5.2 Plans and supporting calculations

5.2.4 Where an ***IWS** (~~In-water~~ In-Water Survey) notation is to be assigned (*see Pt 1, Ch 2, 2.3 Class notations (hull) 2.3.11*), plans and information covering the following items are to be submitted:

- Details showing how rudder pintle and bush clearances are to be measured and how the security of the pintles in their sockets is to be verified with the vessel afloat.
- Details showing how for water lubricated bearings, sternbush ~~stern bush~~ clearances are to be measured with the vessel afloat.
- Details of high resistance paint, for information only.

■ *Section 9*
Procedures for testing tanks and tight boundaries

9.2 Application

~~9.2.2 Attention is drawn to SOLAS *Regulation 11 – Initial testing of watertight bulkheads, etc*. Exemptions of structural tests detailed in SOLAS *Regulation 11 – Initial testing of watertight bulkheads, etc*. are to be agreed with the relevant Flag Administration.~~

9.2.2 Testing procedures for watertight compartments for SOLAS Ships (including CSR BC & OT) are to be carried out in accordance with *Pt 3, Ch 1, 9.4 Structural test procedures for SOLAS ships*, unless:

(a) the shipyard provides documentary evidence of the Shipowner's agreement to a request to the responsible Flag Administration for an exemption from the application of SOLAS Regulation 11 – Initial testing of watertight bulkheads, etc., or for an equivalency agreeing that the content of *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships* is equivalent to SOLAS Regulation 11 – Initial testing of watertight bulkheads, etc., and;

(b) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

9.2.3 Where the requirements of *Pt 3, Ch 1, 9.2 Application 9.2.2 (a)* and *Pt 3, Ch 1, 9.2 Application 9.2.2 (b)* have been met, then the testing procedures for watertight compartments for SOLAS Ships (including CSR BC & OT) are to be carried out in accordance with *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships.*

9.2.4 Testing procedures for watertight compartments for non-SOLAS Ships are to be carried out in accordance with *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships*.

Existing paragraphs 9.2.3 and 9.2.4 have been renumbered 9.2.5 and 9.2.6.

Table 1.9.1 Testing requirements

Item to be tested	Testing procedure	Testing requirement
Double bottom tanks, *see* Note 1	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 2,4 m above top of tank, *see* Note 2 • head of water up to bulkhead deck
Combined double bottom and hopper side tanks	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water representing the maximum pressure experience in service
Double bottom voids, *see* Note 3	Leak	
Double side tanks	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 2,4 m above top of tank, *see* Note 2 • head of water up to bulkhead deck
Combined double bottom, lower hopper and topside tanks	Leak and structural	
Topside tanks	Leak and structural	
Double side voids	Leak	

Deep tanks (other than those listed elsewhere)	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 2,4 m above top of tank, *see* Note 2
Cargo oil tanks, and fuel oil bunkers	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 2,4 m above top of tank, *see* Note 2 • head of water up to top of tank, *see* Note 2, plus setting of fitted pressure-relief valve
Scupper and discharge pipes in way of tanks	Leak and structural	
Ballast hold of bulk carriers	Leak and structural	~~• Head of water up to the top of cargo hatch coaming, *see* Note 10~~ Head of water up to the top of cargo hatch coaming, *see* Note 9
Holds used for in-port ballasting	Leak and structural	~~A head~~ Head of water representing the maximum loading that will occur in-port as indicated in the Loading Manual.
Peak tanks, *see* Note 4	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 2,4 m above top of tank, *see* Note 2
Fore peak spaces with equipment	Leak	
Fore peak voids	Leak ~~and structural~~	~~Head of water up to the bulkhead deck, *see* Note 8~~
Aft peak spaces with equipment	Leak	
Aft peak voids, *see* Note 4	Leak	
Cofferdams	Leak	
Watertight bulkheads	Leak	*See* Note 5
Superstructure end bulkhead	Leak	
Watertight doors below freeboard or bulkhead deck	Leak	*See* Notes ~~5 and~~ 6 and 12
Double plate rudder blades	Leak	
Shaft tunnel clear of deep tanks	Leak	*See* Note 5
Shell doors when fitted in place	Leak	*See* Notes 5 and 7
Weathertight doors, hatch covers and closing appliances	Leak	*See* Note 5
Steel hatch covers fitted to the cargo oil tanks and cargo holds of ships used for the alternate carriage of oil cargo and dry bulk cargo	Leak	*See* Note 5
Chain locker	Leak and structural	Head of water up to top of chain pipe
Independent edible liquid tanks	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 0,9 m above top of tank, *see* Note 2
L.O. Sump tanks and other similar tanks/spaces under main engines	Leak	~~See Note 5~~ *See* Notes 5 and 11
Ballast ducts	Leak and structural	The greater of: • ballast pump maximum pressure • setting of pressure-relief valve
Chemical tanker cargo tanks	Leak and structural	The greater of:

		• head of water 2,4 m above top of tank, *see* Notes 2 and ~~9~~ 8 • head of water up to top of tank, *see* Notes 2 and ~~9~~ 8, plus setting of fitted pressure-relief valve
Independent tanks, *see* Note 13	Leak and structural	The greater of: • head of water up to the top of the overflow • head of water 2,4 m above top of tank, *see* Note 2

Note 1. Including tanks arranged in accordance with the provisions of SOLAS *Regulation 9 – Double bottoms in passengers ships and cargo ships other than tankers.*

Note 2. Top of tank is the deck forming the top of the tank, excluding any hatchways. In holds for liquid cargo or ballast with large hatch openings, the top of tank is to be taken to the top of the hatch.

Note 3. Including dry compartments and duct keels arranged in accordance with the provisions of SOLAS *Regulation 9 - Double bottoms in passenger ships and cargo ships other than tankers* and *Regulation 11 - Initial testing of watertight bulkheads, etc*. ~~.~~2, as well as voids used for the protection of fuel oil tanks and pump rooms arranged in accordance with the provisions of MARPOL Annex *I, Regulation 12A – Oil fuel tank protection* and *Regulation 22 - Pump-room bottom protection*.

Note 4. Testing of the aft peak is to be carried out after the sterntube has been fitted.

Note 5. A hose test will be considered, *see* ~~*Pt 3, Ch 1, 9.5 Leak test procedures 9.5.2*~~ *Pt 3, Ch 1, 9.6 Leak test procedures 9.6.2* and ~~*Pt 3, Ch 1, 9.6 Definitions and details of tests 9.6.3.*~~ *Pt 3, Ch 1, 9.7 Definitions and details of tests 9.7.3.*

Note 6. Watertight doors not confirmed watertight by a prototype test are to be subject to a hydrostatic test, *see* SOLAS *Regulation 16 - Construction and initial tests of watertight doors, sidescuttles, etc.*~~.~~

Note 7. For shell doors providing watertight closure, watertightness is to be demonstrated through prototype testing before installation. The testing procedure is to be agreed with LR prior to testing.

~~Note 8. Where demonstrated to be impracticable, the structural testing of fore peak void spaces may be exempted subject to the agreement of the attending Surveyor.~~

Note ~~9~~ 8. Where a cargo tank is designed for the carriage of cargoes with a specific gravity greater than 1,0, an appropriate additional head is to be considered.

Note ~~10~~ 9. Where air vents are fitted below the top of the coaming, adequate blanking off of these vents may be required prior to the commencement of the test.

Note ~~11~~ 10. Other testing methods listed in *Pt 3, Ch 1, 9.6 Definitions and details of tests 9.6.7* and *Pt 3, Ch 1, 9.6 Definitions and details of tests 9.6.8* may be considered, subject to adequacy of such testing methods being verified, *see* SOLAS *Regulation 11 - Initial testing of watertight bulkheads, etc.*~~.~~

Note 11. Where L.O. sump tanks and other similar spaces under main engines intended to hold liquid form part of the watertight subdivision of the ship, they are to be tested in accordance with the requirements for deep tanks (other than those listed elsewhere).

Note 12. All watertight doors are to be hose tested after installation. Hose testing is to be carried out from each side of a door unless, for a specific application, flooding is anticipated from only one side. Where a hose test is not practicable because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by an ultrasonic leak test or an equivalent test.

Note 13. Independent tanks not confirmed watertight by a prototype test are to be subject to a hydrostatic test. A leak test is to be carried out after installation on board.

9.4 Structural test procedures for SOLAS ships

9.4.1 Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, shall be tested for tightness and structural strength as indicated in *Table 1.9.1 Testing requirements*.

9.4.2 Watertight subdivision means the transverse and longitudinal subdivisions of the ship required to satisfy the subdivision requirements of SOLAS Chapter II-1.

Existing paragraphs 9.4.1 and 9.4.2 have been renumbered 9.4.3 and 9.4.4.

~~9.4.3 For tanks of the same structural design, configuration and the same general workmanship, as determined by the attending Surveyor, a structural test may be carried out on only one tank, provided all subsequent tanks are tested for leaks by an air test. The relaxation to accept leak testing using an air test instead of a structural test does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutants.~~

~~9.4.4 Where the structural adequacy of a tank has been verified by structural testing on a previous vessel in a series, tanks of structural similarity on subsequent vessels within that series (which are built at the same shipyard) may be exempt from such testing, provided that the watertightness of all exempt tanks is verified by leak tests and thorough inspection. However, structural testing is to be carried out for at least one tank of each type of tank on every vessel in the series. The relaxation to accept leak testing and thorough inspections instead of a structural test on subsequent vessels in a series does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutants.~~

~~9.4.5 For sister ships built two or more years after the delivery of the last ship of the series, the relaxation provided for in *Pt 3, Ch 1, 9.4 Structural test procedures 9.4.4* may be accepted provided that the general practices, equipment and workmanship of the shipyard have been maintained continuously, and an enhanced NDT programme is implemented for the tanks not subject to structural tests.~~

~~9.4.6 Tanks exempted from structural testing in *Pt 3, Ch 1, 9.4 Structural test procedures 9.4.3* and *Pt 3, Ch 1, 9.4 Structural test procedures 9.4.4* may require structural testing if found necessary after the structural testing of the first tank.~~

~~9.4.7~~ 9.4.5 Consideration is to be given to the selection of tanks to be structurally tested. Selected tanks are to be chosen so that all representative structural members are tested for the expected tension and compression. Tank boundaries are to be tested from at least one side.

~~9.4.8~~ 9.4.6 For watertight boundaries of spaces other than tanks, excluding ballast holds, chain lockers and cargo holds which are intended to be used for in-port ballasting, structural testing may be exempted completely, provided that the watertightness in all boundaries of exempted spaces are verified by leak tests and thorough inspection. The testing of ballast holds, chain lockers and cargo holds which are intended to be used for in-port ballasting, are to comply with the requirements of *Pt 3, Ch 1, 9.4 Structural test procedures for SOLAS Ships 9.4.1* to *Pt 3, Ch 1, 9.4 Structural test procedures for SOLAS Ships ~~9.4.7~~ 9.4.5.*

9.4.7 Tanks which do not form part of the watertight subdivision of the ship, need not be structurally tested providing that the watertightness of all boundaries of these spaces is verified by leak tests and thorough inspection.

9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships

9.5.1 Testing procedures are to be carried out in accordance with the requirements of *Pt 3, Ch 1, 9.4 Structural test procedures for SOLAS ships* in association with the alternative test procedures given in *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships 9.5.2* to *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships 9.5.5.*

9.5.2 For tanks of the same structural design, configuration and the same general workmanship, as determined by the attending Surveyor, a structural test need only be carried out on one tank, provided that all subsequent tanks are tested for leaks by an air test. The relaxation to accept leak testing using an air test instead of a structural test does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ship.

9.5.3 Where the structural adequacy of a tank has been verified by structural testing on a previous vessel in a series, tanks of structural similarity on subsequent vessels within that series (which are built at the same shipyard) need not be structurally tested, provided that the watertightness of all exempt tanks is verified by leak tests and thorough inspection. However, structural testing is to be carried out for at least one tank of each type of tank on every vessel in the series. The relaxation to accept leak testing and thorough inspections instead of a structural test on subsequent vessels in a series does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ship.

9.5.4 For sister ships built two or more years after the delivery of the last ship of the series, the application of the provisions of *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships 9.5.3* will be specially considered provided that the general practices, equipment and workmanship of the shipyard have been maintained continuously, and an NDT programme is implemented for the tanks not subject to structural tests.

9.5.5 Tanks exempted from structural testing in *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships 9.5.2* and *Pt 3, Ch 1, 9.5 Structural test procedures for non-SOLAS ships and SOLAS exempt/equivalent ships 9.5.3* will require structural testing if found necessary after the structural testing of the first tank.

Existing sub-Sections 9.5 to 9.8 have been renumbered 9.6 to 9.9.

Part 3, Chapter 2
Materials

■ *Section 1*
Materials of construction

1.2 Steel

Table 2.1.1 Values of k_L

Specified minimum yield stress in N/mm^2	k_L
235	1,0
265	0,92
315	0,78
355	0,72
390	0,68 (0,66 *see* Note 3)
460 *see* Note ~~3~~ 4	0,62 *see* Note ~~3~~ 4
Note 1. Intermediate values by linear interpolation. Note 2. For the purpose of calculating hull moment of inertia as specified in *Pt 3, Ch 4, 5.8 Hull moment of inertia 5.8.1*, ~~k_L~~ k_L= 1,0. Note 3. A k_L factor of 0,66 may be applied to all ship types provided that a fatigue assessment is carried out as required by *Pt 3, Ch 2, 1.2 Steel 1.2.4*. ~~Note 3.~~ Note 4. Grade only applies to thickness above 50 mm for upper deck, hatch coamings, shear strake, uppermost strake of longitudinal bulkhead and other longitudinal strength members in way of the above structures of container ships. The requirements specified in *Ch 3, 3 Higher strength steels for ship and other structural applications* of the Rules for Materials apply, *see Pt 3, Ch 2, 1.2 Steel 1.2.4* and *Pt 3, Ch 2, 1.2 Steel 1.2.5*.	

1.2.5 For container ships only~~, a *k* L factor of 0,66 may be applied to steel with a specified minimum yield stress of 390 N/mm^2, or a k_L~~ k_L factor of 0,62 may be applied to steel with a specified minimum yield stress of 460 N/mm^2 for structural members that contribute to the ship's longitudinal strength, provided that:

(a) the member's plate or web thickness is greater than 50 mm *see also Pt 4, Ch 8, 2.3 Requirements for use of thick steel plates*;
(b) the requirements of *Pt 3, Ch 2, 1.2 Steel 1.2.4* are satisfied; and
(c) a spectral fatigue assessment is carried out in accordance with *ShipRight Fatigue Design Assessment* (FDA level 3) procedure, to demonstrate that key structural details sensitive to the hull girder loads have satisfactory fatigue performance.

The assessment should normally include the following:

- Hatch corners in way of cross-deck strips;
- Hatch corners at the forward region;
- Hatch corners forward and aft of the engine room and the accommodation blocks;
- Connection of hatch coaming to supporting structure; and
- Other critical locations subject to dynamic hull girder bending and torsional effects.

In addition, the ShipRight Construction Monitoring (CM) procedure is to be applied to the fatigue critical locations described above.

Part 3, Chapter 4
Longitudinal Strength

Existing Section 6 has been replaced with the following.

■ *Section 6*
Hull shear strength

6.1 Symbols

6.1.1 The symbols used in this Section are defined as follows:

q_V = unit shear flow per mm along the cross-section under consideration, in N/mm, *see Pt 3, Ch 4, 6.2 General 6.2.2* and *Pt 3, Ch 4, 6.2 General 6.2.3*

Q_S = design hull still water shear force, in kN, to be taken as negative or positive according to the convention given in *Pt 3, Ch 4, 6.4 Design still water shear force 6.4.2*

$\overline{Q_S}$ = permissible hull still water shear force, in kN, *see Pt 3, Ch 4, 6.5 Permissible still water shear force*

Q_w = design hull wave shear force, in kN, to be taken as negative or positive according to the convention given in *Pt 3, Ch 4, 6.4 Design still water shear force 6.4.2*

τ = permissible combined shear stress (still water plus wave), in N/mm^2, *see Pt 3, Ch 4, 6.6 Permissible shear stress*

τ_A = design shear stress, in N/mm^2, as given in *Pt 3, Ch 4, 6.7 Design shear stress 6.7.1*

6.2 General

6.2.1 For ships with length *L* greater than 65 m, the shear forces on the hull structure are to be investigated.

6.2.2 Shear flow calculation procedures are generally to be in accordance with *ShipRight Procedure Additional Calculation Procedures for Container Ships, July 2016.*

6.2.3 Where shear flow calculation procedures, other than those available within ShipRight, are employed, the requirements of *Pt 3, Ch 1, 3 Equivalents* are to be complied with.

6.2.4 For passenger ships, the assessment of permissible still water shear forces is to take into consideration the effectiveness of the continuous superstructures and the sizes and arrangements of window and door openings.

6.2.5 Where longitudinal bulkheads are perforated by cut-outs, the assessment of permissible still water shear forces is to take into consideration the loss of material.

6.2.6 For ships where the side shell, side casings, superstructure or longitudinal bulkheads contain large openings or large numbers of windows or openings, consideration is to be given to assessing the permissible still water shear forces using direct calculation techniques.

6.3 Design wave shear force

6.3.1 The design wave shear force, Q_w, at any position along the ship is given by:

$$Q_W = K_1 K_2 Q_{WO} \text{ kN}$$

where

$$Q_{WO} = 0{,}3 C_1 LB(C_b + 0{,}7) \text{ kN}$$

C_1 is given in *Table 4.5.1 Wave bending moment factor* and C_b is to be taken not less than 0,6.

K_1 is to be taken as follows, *see also Figure 4.6.1 Shear force factor* K_1:

(a) Positive shear force

$K_1 = 0$ at aft end of *L*

$= \frac{1{,}589 C_b}{(C_b + 0{,}7)}$ between 0,2*L* and 0,3*L* from aft

$= 0{,}7$ between 0,4*L* and 0,6*L* from aft

$= 1{,}0$ between 0,7*L* and 0,85*L* from aft

$= 0$ at forward end of *L*

(b) Negative shear force

$K_1 = 0$ at aft end of *L*

$= -0{,}92$ between 0,2*L* and 0,3*L* from aft

$= -0{,}7$ between 0,4*L* and 0,6*L* from aft

$= \frac{-1{,}727 C_b}{(C_b + 0{,}7)}$ between 0,7*L* and 0,85*L* from aft

$= 0$ at forward end of *L*

Intermediate values to be determined by linear interpolation.

$K_2 = 1{,}0$ for unrestricted sea-going service conditions

$= 0{,}8$ for short voyages

$= 0{,}5$ for operation in sheltered water.

6.4 Design still water shear force

6.4.1 The design still water shear force, Q_s, at each transverse section along the hull is to be taken as the maximum positive and negative value found from the longitudinal strength calculations for each of the loading conditions given in *Pt 3, Ch 4, 5.3 Design still water bending moments 5.3.3* and is to satisfy the following relationship:

$$|Q_s| \leq |\overline{Q_s}|$$

6.4.2 Still water shear forces are to be calculated at each section along the ship length. For these calculations, downward loads are to be taken as positive values and are to be integrated in a forward direction from the aft end of *L*. The shear force is positive when the algebraic sum of all vertical forces aft of the section is positive.

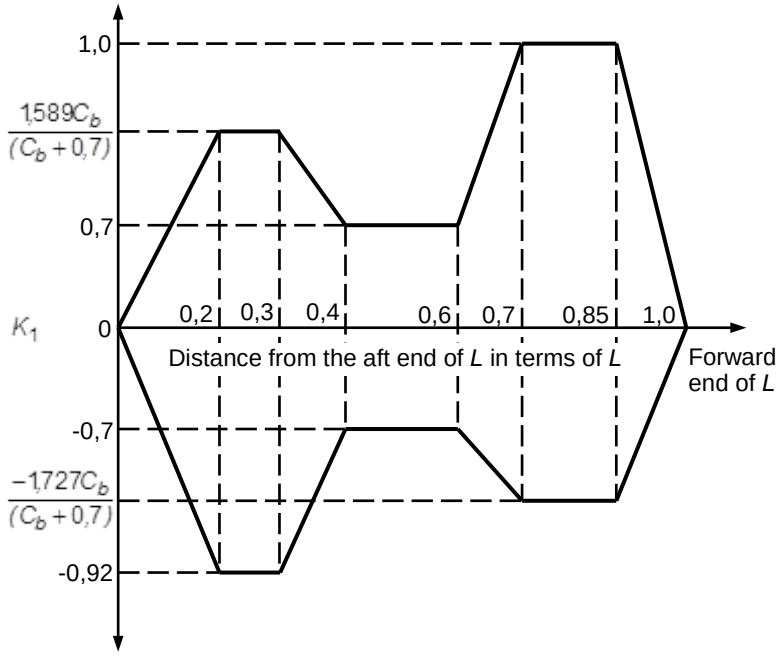

Figure 4.6.1 Shear force factor K_1

6.4.3 For hull configurations where there are no longitudinal bulkheads (not including the inner hull) and where loading conditions feature either:

- cargo loading with specified or alternative cargo holds (or cargo tanks) empty; or
- ballasting of cargo hold(s);

The actual shear forces obtained from the longitudinal strength calculations are to be corrected for the effect of local forces at the transverse bulkheads. The calculation of these local forces is to be submitted for approval or, alternatively, the proportion of the double bottom load carried by the transverse bulkhead can be arrived at by using the following bulkhead factor *F*:

$$F = \frac{1}{1 + 1{,}5\alpha^{1{,}65}}$$

where

$$\alpha = \frac{S_H}{l_F}$$

l_F = Span of floors measured to the intersection of the hopper or ship's side, and inner bottom, in metres

S_H = length of hold measured between bulkhead stools, where fitted, at the level of the inner bottom on the centreline, in metres

6.4.4 If the hull shear forces in kN at transverse bulkheads A and B are calculated to be Q_A and Q_B respectively (with

appropriate algebraic signs), the excess load or buoyancy over hold AB is given by $Q_B - Q_A$ and the load transmitted to each bulkhead is:

$0{,}5F(Q_B - Q_A)$ kN

where F is the bulkhead factor as given in *Pt 3, Ch 4, 6.4 Design still water shear force 6.4.3. See Figure 4.6.2 Shear force correction*.

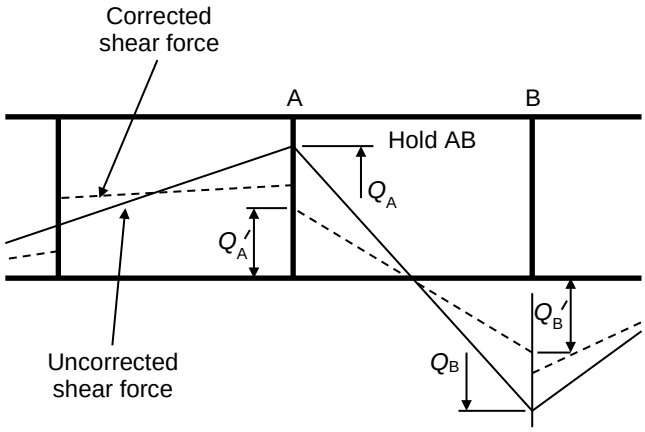

Figure 4.6.2 Shear force correction

6.4.5 The corrected shear forces, Q'_A and Q'_B, at bulkheads A and B with respect to hold AB are then obtained from:

$Q'_A = Q_A + 0{,}5F(Q_B - Q_A)$ kN

$Q'_B = Q_B - 0{,}5F(Q_B - Q_A)$ kN

6.5 Permissible still water shear force

6.5.1 Still water shear forces are to be determined for all vertical structural elements which contribute to the shear strength capability of the ship. The permissible hull still water shear force is given by the minimum value obtained from:

$$\left|\overline{Q_S}\right| = \tau m \frac{t \times 10^{-3}}{q_v} - \left|Q_W\right| \text{ kN}$$

where

t = the plate thickness of the structural member at the vertical level and section under consideration, in mm

m is given in *Pt 3, Ch 4, 6.5 Permissible still water shear force 6.5.2*

q_v is the shear flow in the structural member at the vertical level and section under consideration, calculated in accordance with the *ShipRight Procedure Additional calculation procedures*.

6.5.2 To account for the effects of non-uniform loading in the transverse direction, m is to be taken as follows:

$m = 0{,}9$ for loading conditions where the cargo region between two consecutive bulkheads, *see Figure 4.6.3 Examples of uneven transverse loading*, within $0{,}2L_T$, is unevenly loaded in the transverse direction. Where there are two longitudinal bulkheads, the symmetric loading condition where the centre region has a different filling height to the port and starboard regions is considered to be uneven loading in the transverse direction.

$m = 1{,}0$ otherwise.

where

L_T is the cargo hold length, in metres.

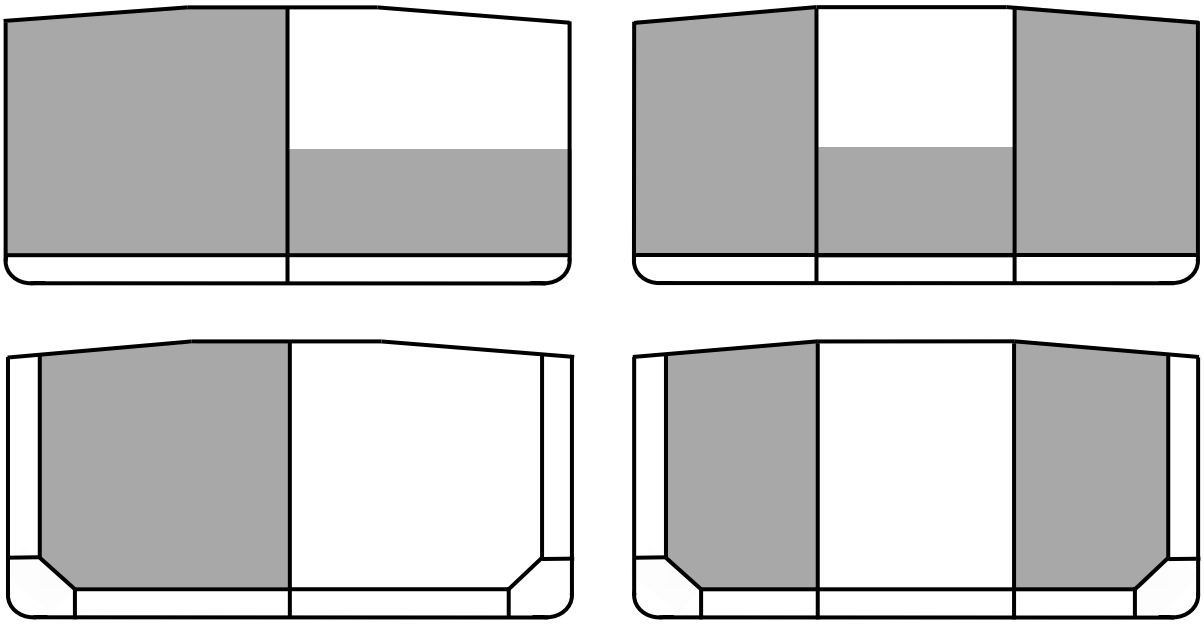

Figure 4.6.3 Examples of uneven transverse loading

6.5.3 For hull configurations where loading conditions are such that hull girder torsion is induced, direct calculations are to be undertaken if considered necessary.

6.5.4 The calculation of shear forces immediately beyond the ends of the longitudinal bulkheads will be considered in relation to the arrangement of structure in these regions.

6.6 Permissible shear stress

6.6.1 The permissible combined shear stress (still water plus wave) is to be taken as:

$$\tau = \frac{110}{k_L} \text{ N/mm}^2$$

6.6.2 Where a plate is tapered, the permissible combined shear stress is not to be exceeded at any point in way of the taper, *see Figure 4.6.4 Tapered plates.*

6.7 Design shear stress

6.7.1 The design shear stress for use in *Pt 3, Ch 4, 7.4 Design stress* is to be taken as:

$$\tau_A = \frac{|Q_s| + |Q_w|}{mt/q_v} \times 10^3 \text{ N/mm}^2$$

where

t and q_v are given in *Pt 3, Ch 4, 6.5 Permissible still water shear force 6.5.1*

m is given in *Pt 3, Ch 4, 6.5 Permissible still water shear force 6.5.2*.

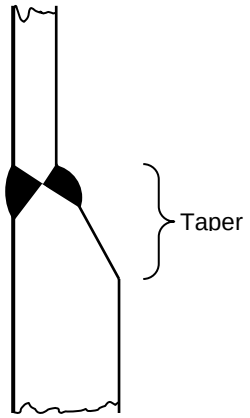

Figure 4.6.4 Tapered plates

Part 3, Chapter 9
Special Features

■ *Section 6*
Lifting appliances and support arrangements

6.1 General

6.1.2 Where the lifting appliance is considered to be an essential feature of a classed ~~ship~~ vessel, the special feature class notation **LA** or **LȦ** will, in general, be mandatory.

6.3 Support structure for masts, derrick posts and ~~crane~~ lifting appliance pedestals

6.3.4 The deck plating and underdeck stiffening in way of a lifting appliance are to be assessed using the same criteria used to assess the lifting appliance pedestal with due consideration given to the material grade.

6.3.5 Insert plates are to be incorporated in the deck plating in way of lifting appliance foundations where considered necessary to limit deflection and reduce stress concentrations. The thickness of the insert plates is to be as required by the designer's calculations but in no case is to be taken as less than 1.5 times the thickness of the adjacent attached plating.

6.3.6 Where fitted, all inserts are to have well radiused corners and be suitably edge prepared prior to welding. The connection between the insert plate and the adjacent deck plating is to be full penetration. All other welding in way of the insert plate is generally to be double continuous and full penetration in way of critical locations. Tapers are to be not less than three to one.

6.4 Lifting appliances

6.4.1 ~~Ships~~ Vessels or offshore units fitted with classed lifting appliances will be eligible to be assigned Special Features class notations as listed in *Table 9.6.1 Special features class notations associated with lifting appliances*. This notation will be retained so long as the appliances are found upon examination at the prescribed surveys to be maintained in accordance with LR's requirements.

Table 9.6.1 Special features class notations associated with lifting appliances

Lifting appliance	Special features class notation	Remarks
Cargo gear, derricks, derrick cranes or cranes on vessels	**CG**	*Optional notation.* Indicates that the ~~ship's~~ vessel's cargo gear is included in class.
Cranes on offshore units, offshore installations and offshore support vessels	**OC**	*Optional notation.* Indicates that the installation's, unit's or vessel's main deck cranes are included in class.
Pipe laying system	**PLS**	*Optional notation.* Indicates that the pipe laying system is included in class.
~~Personal~~ Personnel transfer system (Walk-to-Work)	**W2W**	*Optional notation.* Indicates that the personnel transfer system is included in class.
Lifts and ramps on ~~ship's~~ vessels	**CL** **PL** **CR**	*Optional notations.* Indicate that the ~~ship's~~ vessel's cargo lifts (CL), passenger lifts (PL) or cargo ramps (CR) are included in class.
Lifting appliances forming an essential feature of the vessel, e.g. cranes on crane barges or pontoons, lifting arrangements for diving on diving support ~~ships~~ vessels, etc.	**LA**	*Mandatory notation.* Indicates that the lifting appliance is included in class.
Lifting appliances forming an essential feature of the vessel where the appliance(s) has been classed by a recognised classification society other than LR and later transferred into class with LR.	**LA**	*Mandatory notation.* Indicates that the lifting appliance is classed and that initial requirements for the appliance were that of another recognised classification society.

Part 3, Chapter 13
Ship Control Systems

■ *Section 9*
Mooring of ships at single point moorings

9.2 Arrangements

(Part only shown)

9.2.3 Bow chain stoppers:

(e) ~~Details of bow chain stoppers should be submitted for approval.~~ The bow chain stopper(s) are to be type approved confirming that they are constructed in strict compliance with a standard recognised by LR which specifies SWL, yield strength and safety factors.

(Part only shown)

9.2.4 Smit-Type Brackets:

(f) ~~Details of Smit-Type Brackets should be submitted for approval.~~ The Smit-Type Bracket(s) are to be type approved confirming that they are constructed in strict compliance with a standard recognised by LR which specifies SWL, yield strength and safety factors.

9.2.5 The forecastle deck in way of bow chain stoppers or Smit-Type Brackets is to have a minimum thickness of 15 mm ~~and is to be suitably reinforced to resist horizontal loads equal to 2 x SWL as given in *Table 13.9.2 Fittings requirements for deadweight group*.~~ Their foundations and associated ship supporting structure are to be demonstrated adequate to resist horizontal loads equal to 2 x SWL as given in *Table 13.9.2 Fittings requirements for deadweight group*. This is to be accomplished by detailed engineering analysis or calculations together with an inspection of the installation.

9.2.6 Bow chain stoppers or Smit-Type Brackets are to be permanently marked with the SWL and appropriate serial numbers so that the certificates can be easily cross-referenced to the fitted equipment.

(Part only shown)

~~9.2.6~~ 9.2.7 Bow fairleads:

(e) ~~Details of bow fairleads and their attachment to the bulwark should be submitted for approval.~~ The bow fairleads are to be type approved confirming that they are constructed in strict compliance with a standard recognised by LR which specifies SWL and safety factors.

(f) Their foundations and associated ship supporting structure are to be demonstrated adequate by detailed engineering analysis or calculations together with an inspection of the installation.

Existing paragraphs 9.2.7 and 9.2.8 have been renumbered 9.2.8 and 9.2.9.

Part 3, Chapter 16
ShipRight Procedures for the Design, Construction and Lifetime Care of Ships

■ *Section 11*
Inventory of ~~hazardous materials~~ Hazardous Materials

11.1 Inventory of ~~hazardous materials~~ Hazardous Materials – Descriptive note IHM

11.1.1 Compliance with this procedure is optional. A ship meeting the requirements of this procedure will be eligible for ~~an~~ the descriptive note **IHM** ~~**IHM** Descriptive Note~~, ~~which will be recorded in column 6 of the *Register Book.*, except as indicated in *Pt 3, Ch 16, 11.1 Inventory of hazardous materials – Descriptive note IHM 11.1.2.*~~

~~11.1.2 If a ship has been assigned the **ECO** notation, then it will not be eligible for an **IHM** Descriptive Note. Instead, **IHM** will be referenced in the **ECO** notation, i.e. **ECO(IHM).**~~

Part 4, Chapter 2
Ferries, Roll On-Roll Off Ships and Passenger Ships

■ *Section 1*
General

1.1 Application

~~1.1.1 This Chapter applies to sea-going roll-on-roll-off cargo ships, passenger ships, sailing passenger ships and passenger yachts defined as follows:~~

~~(a) A passenger ferry is defined as a ship specially designed and constructed for the carriage of passengers on a regular scheduled service between specified ports operating in reasonable weather conditions.~~

~~(b) A passenger/vehicle is defined as a ship specially designed and constructed for the carriage of passengers and vehicles on a regular scheduled service between specified ports operating in reasonable weather conditions.~~

~~(c) A roll-on-roll-off cargo ship is defined as a ship specially designed and constructed for the carriage of vehicles, and cargo in pallet form or in containers, and loaded/unloaded by wheeled vehicles.~~

~~(d) A passenger ship is defined as a ship specially designed and constructed for the carriage of more than 12 passengers.~~

~~(e) A sailing passenger ship is defined as a ship specially designed and constructed for the carriage of more than 12 passengers and incorporating sail devices which are intended to be the primary means of propulsion.~~

~~(f) A passenger yacht is defined as a yacht that is specially designed and constructed in accordance with Administration requirements for passenger yachts with due regard to the applicability of the conventions as given in *Pt 1, Ch 2, 1.1 General 1.1.9*, as determined in accordance with the *Red Ensign Group Code of Practice for Yachts Carrying 13 to 36 Passengers (Passenger Yacht Code),* as amended or an alternative administration code deemed acceptable by LR.~~

1.1.1 This Chapter applies to seagoing passenger ships and ferries, including those with roll on-roll off capability, as well as passenger yachts, sailing passenger ships, roll on-roll off cargo ships and vehicle carriers defined as follows:

(a) A **passenger ship** is defined as a ship specially designed and constructed for the carriage of more than 12 passengers.

(b) A **passenger ferry** is defined as a ship specially designed and constructed for the carriage of more than 12 passengers on a regular scheduled service between specified ports operating in reasonable weather conditions. Reasonable weather is defined in *Pt 1, Ch 2, 2.1 Definitions 2.1.5.*

(c) A **roll on-roll off passenger ship** is defined as a ship specially designed and constructed for the carriage of more than 12 passengers, as well as the carriage of vehicles accessed by means of ramps and doors located at the bow, stern or through the side shell, or any combination thereof.

(d) A **roll on-roll off passenger ferry** is defined as a ship specially designed and constructed for the carriage of more than 12 passengers, as well as the carriage of vehicles accessed by means of ramps and doors located at the bow, stern or through the side shell, or any combination thereof where the ferry is on regular scheduled service between specified ports operating in reasonable weather. Reasonable weather is defined in *Pt 1, Ch 2, 2.1 Definitions 2.1.5.*

(e) A **passenger/vehicle ferry** has the same definition as a roll on-roll off passenger ferry.

(f) A **passenger yacht** is defined as a yacht that is specially designed and constructed in accordance with Administration requirements for passenger yachts with due regard to the applicability of the conventions as given in *Pt 1, Ch 2, 1.1 General 1.1.9*, as determined in accordance with the *Red Ensign Group Code of Practice for Yachts Carrying 13 to 36 Passengers (Passenger Yacht Code),* as amended or an alternative administration code deemed acceptable by LR.

(g) A **sailing passenger ship** is defined as a ship specially designed and constructed for the carriage of more than 12 passengers and incorporating sail devices which are intended to be the primary means of propulsion.

(h) A **roll on-roll off cargo ship** is defined as a ship specially designed and constructed for the carriage of vehicles and cargo in pallet form or in containers, loaded/unloaded by wheeled vehicles and accessed by means of ramps and doors located at the bow, stern or through the side shell, or any combination thereof.

(i) A **vehicle carrier**, sometimes referred to as a pure car carrier or a pure car/truck carrier, is defined as a ship specially designed and constructed for the carriage of large numbers of vehicles, accessed by means of ramps and doors located at the stern and/or through the side shell.

1.3 Class notations

1.3.1 In general, ships complying with the requirements of this Chapter will be eligible to be classed:

- ~~**'100A1 passenger ferry'**, or~~
- ~~**'100A1 passenger/vehicle ferry'**, or~~
- ~~**'100A1 roll on-roll off cargo ship'**, or~~
- ~~**'100A1 roll on-roll off passenger ship'**, or~~
- ~~**'100A1 vehicle carrier'**, or~~
- ~~**'100A1 passenger ship'**, or~~
- ~~**'100A1 passenger yacht'**, or~~
- ~~**'100A1 sailing passenger ship'.**~~
- **'100A1 passenger ship'**, or
- **'100A1 passenger ferry'**, or
- **'100A1 roll on-roll off passenger ship'**, or

- **‘100A1 roll on-roll off passenger ferry’**, or
- **‘100A1 passenger/vehicle ferry’**, or
- **‘100A1 passenger yacht’**, or
- **‘100A1 sailing passenger ship’**, or
- **‘100A1 roll on-roll off cargo ship’**, or
- **‘100A1 vehicle carrier’**.

Part 4, Chapter 4
Offshore Support Vessels

■ *Section 5*
Lifting appliances, equipment integration and foundations

5.1 Lifting appliances

5.1.1 Where the vessel has fitted onboard lifting appliance(s), which is considered by LR to be essential for the vessel to fulfil its primary operational role, it is a requirement that the ~~vessel~~ lifting appliance(s) is classed in accordance with the requirements of the **LA** or **LȦ** notation, *see Pt 3, Ch 9, 6 Lifting appliances and support arrangements*. ~~The lifting appliance(s) are to be designed, built and surveyed in accordance with LR's *Code for Lifting Appliances in a Marine Environment, July 2017*.~~

- Where the **LA** notation is assigned, the lifting appliance(s) are to be designed, built and surveyed in accordance with LR's *Code for Lifting Appliances in a Marine Environment, July 2017*.
- Where the **LȦ** notation is assigned, the lifting appliance(s) have been classed by a recognised classification society other than Lloyd's Register and later transferred into class with LR. In such cases, a new Register of Ship's Lifting Appliances & Cargo Handling Gear (LA.1) will be issued in accordance with LR's *Code for Lifting Appliances in a Marine Environment*, *July 2017*. From the time the **LȦ** notation is assigned, the subject appliance(s) is to be tested and surveyed in accordance with LR's *Code for Lifting Appliances in a Marine Environment, July 2017.*

A lifting appliance forms an essential feature of a vessel if the purpose of the vessel is predominantly to support the appliance, and the purpose of the floating structure is impaired if the appliance is not functioning.

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